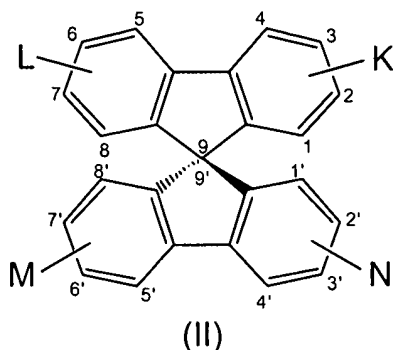


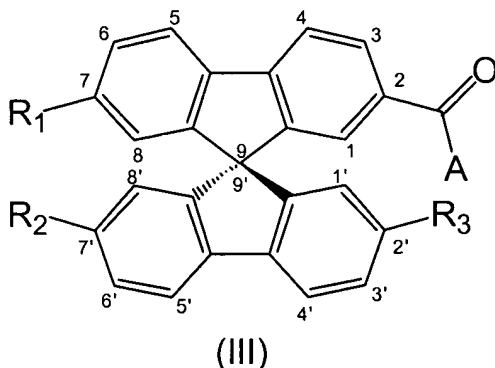
## CLAIMS

1. Spirobifluorene derivatives and corresponding radical anions having the following general formula (II):



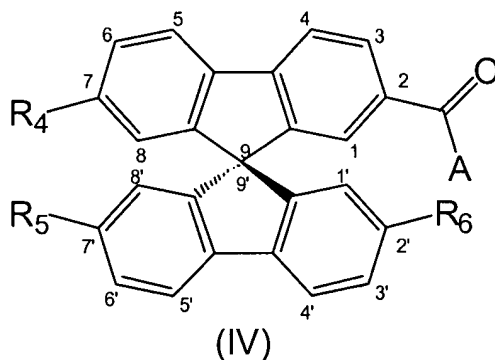
- 5 in which K, L, M and N, the same or different from each other, are independently: H or A-C=O, with the proviso that it is never K = L = M = N = H, wherein A is an aromatic group bearing at least one radical R, with R = H or aliphatic group.
2. Spirobifluorene derivatives and corresponding radical anions according to  
10 claim 1 wherein A is selected among: aromatic groups, aromatic groups containing heteroatoms, condensed aromatic groups, condensed aromatic groups containing heteroatoms, and corresponding derivatives.
3. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein A is selected in the group of the following derivatives: phenyl,  
15 biphenyl, 1-naphthyl, 2-naphthyl, 2-thienyl, 2-furyl, 2-pyrrolyl, 3-thienyl, 3-furyl, 3-pyrrolyl, 9-anthryl, biphenylenyl, perylenyl, fullereryl, and corresponding derivatives.
4. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein R = linear, branched or cyclic aliphatic C<sub>1</sub>-C<sub>n</sub>, with n positive  
20 integer ≥ 0, preferably C<sub>1</sub>-C<sub>18</sub>, more preferably C<sub>1</sub>-C<sub>6</sub>.
5. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein A is substituted with at least one R' group where R' is selected in the group of: halogens, trifluoromethyl, hydroxyl, -SH, -SC[C<sub>1-6</sub>(alkyl)], alkoxy, nitro, cyano, -COOH, -COOC[C<sub>1-4</sub>(alkyl)], -NH<sub>2</sub>, -NC[C<sub>1-4</sub>(alkyl)]<sub>2</sub>, benzyl,  
25 benzoyl.
6. Spirobifluorene derivatives having the general formula (III) and corresponding

radical anions:



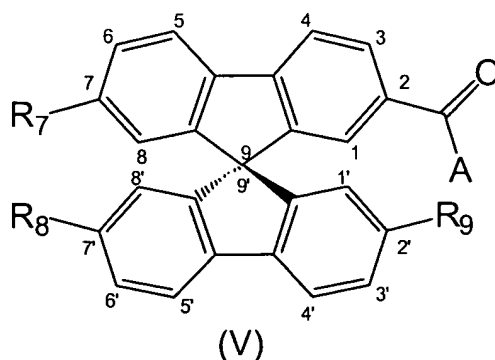
wherein A is an aromatic group and  $R_1 = R_2 = R_3 = H$ ; or  $R_1 = R_3 = H$  and  $R_2 = C_{1-6}(\text{alkyl})$ ; or  $R_1 = R_2 = H$  and  $R_3 = C_{1-6}(\text{alkyl})$ ; or  $R_2 = H$  and  $R_1 = R_3 = C_{1-6}(\text{alkyl})$ .

7. Spirobifluorene derivatives having the general formula (IV) and corresponding radical anions:



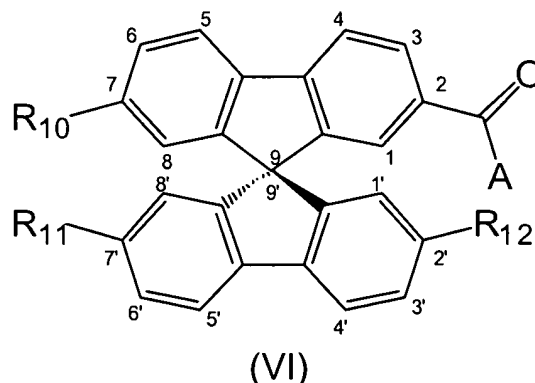
wherein  $R_5 = A-C=O$  with A = aromatic group and  $R_4 = R_6 = H$ ; or  $R_5 = A-C=O$  and  $R_4 = R_6 = C_{1-4}(\text{alkyl})$ ; or  $R_6 = A-C=O$  and  $R_4 = R_5 = H$ ; or  $R_6 = A-C=O$  and  $R_4 = R_5 = C_{1-4}(\text{alkyl})$ .

8. Spirobifluorene derivatives having the general formula (V) and corresponding radical anions:



wherein  $R_7 = R_9 = A-C=O$  with  $A$  = aromatic group and  $R_8 = H$ ; or  $R_7 = R_9 = A-C=O$  and  $R_8 = C_{1-4}(\text{alkyl})$ .

9. Spirobifluorene derivatives having the general formula (VI) and corresponding radical anions;



5 wherein  $R_{10} = R_{11} = R_{12} = A-C=O$  with  $A$  = aromatic group.

10. Spirobifluorene derivatives and corresponding radical anions according to claims 6-9 wherein  $A$  is selected among: aromatic groups, aromatic groups containing heteroatoms, condensed aromatic groups, condensed aromatic groups containing heteroatoms, and corresponding derivatives.

11. Spirobifluorene derivatives and corresponding radical anions according to claims 6-9 wherein  $A$  is selected in the group of: phenyl, biphenyl, 1-naphthyl, 2-naphthyl, 2-thienyl, 2-furyl, 2-pyrrolyl, 3-thienyl, 3-furyl, 3-pyrrolyl, 9-anthryl, biphenylenyl, perylenyl, fullereryl, and corresponding derivatives.

15 12. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein  $L = M = N = H$  and  $K = A-C=O$  in position 2, with  $A$  = phenyl and  $R = H$ .

13. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein  $L = N = H$ ,  $K$  and  $M$  in position 2 and 2' are  $A-C=O$ , with  $A$  = phenyl and  $R = H$ .

14. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein  $L = N = H$ ,  $K$  and  $M$  in position 2 and 7' are  $A-C=O$ , with  $A$  = phenyl and  $R = H$ .

15. Spirobifluorene derivatives and corresponding radical anions according to claim 1 wherein  $L = M = N = H$ ,  $K$  in position 2 is  $A-C=O$  with  $A$  = phenyl and  $R = p\text{-tert-Bu}$ .

16. Spirobifluorene derivatives and corresponding anionic radicals according to claim 1 wherein is: L = N = H, K and M in position 2 and 2' are A-C=O, with A = phenyl and R = p-tert-Bu.
17. Spirobifluorene derivatives and corresponding radical anions according to  
5 claim 1 wherein is: L = M = H, K and N in position 2 and 7' are A-C=O, with A = phenyl and R = p-tert-Bu.
18. Spirobifluorene derivatives and corresponding radical anions according to claims 1-17 in a mixture of them as enantiomers.
19. Spirobifluorene derivatives and corresponding radical anions according to  
10 claims 1-17 in optically pure form.
20. Method for preparing the Spirobifluorene derivatives according to claim 1 comprising the following steps: use the non-functionalised SBF as the starting product (formula (I)) and add to it the compound A-C=OCl with A = aromatic group, in the presence of a Lewis acid, preferably selected among AlCl<sub>3</sub>, AlBr<sub>3</sub>,  
15 FeCl<sub>3</sub>, particularly preferably AlCl<sub>3</sub>, in a solvent preferably selected between CH<sub>2</sub>Cl<sub>2</sub> and CS<sub>2</sub>, particularly preferably CH<sub>2</sub>Cl<sub>2</sub>, at a reaction temperature from 10 °C to reflux.
21. Method for preparing the Spirobifluorene derivatives according to claim 1 comprising the use, as intermediate, of SBF functionalised as acid chloride  
20 SBF(COCl)<sub>x</sub>, with x positive integer ≥1 and equal to the number of substituents to be obtained on the SBF; said acid chloride is then combined with A-H, in which A = aromatic group, said acid chloride intermediate being prepared from the corresponding carboxylic acids of the SBF, SBF(COOH)<sub>x</sub>, in turn obtained from the corresponding acetyl derivatives SBF(COCH<sub>3</sub>)<sub>x</sub>, x having in both cases  
25 the above-mentioned meaning.
22. 9,9'-Spirobi[9H-fluorene]-2,-carbonyl chloride.
23. 9,9'-Spirobi[9H-fluorene]-2,2',7-tricarbonyl trichloride.
24. 9,9'-Spirobi[9H-fluorene]-2,2',7-7'-tetracarbonyl tetrachloride.
25. Electrochemical method for preparing the radical anions corresponding to  
30 the derivatives of the SBF according to claims 1-24, said method being characterised in that said derivatives, to be transformed into radical anions, at a concentration between 0.1 M and 0.1 mM, preferably between 0.01 M and 0.5

mM, particularly preferably approximately 1 mM, are added to an anhydrous aprotic solvent containing a supporting electrolyte, also anhydrous, in order to obtain a concentration of the latter of between 1 M and 0.01 M, preferably 0.2 M and 0.05 M, particularly preferably approximately 0.1 M, the mixture then being  
5 placed in an electrolysis cell and a d.d.p. applied between the electrodes in order to obtain the required radical anion.

26. Electronic devices, in particular systems for electroluminescence, molecular-based computational systems, OLEDs, molecular switching components, components for non-linear optics, molecular-based computational systems,  
10 field-effect transistors, semiconductors with negative differential resistance, said systems comprising elements provided on their surface with at least one layer of a film or coating comprising at least one of the compounds according to claims 1-24.

27. Use of the compounds according to claims 1-24 in components for  
15 molecular electronics, in particular systems for electroluminescence, molecular-based computational systems, OLEDs, molecular switching components, components for non-linear optics, molecular-based computational systems, field-effect transistors and semiconductors with negative differential resistance.